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HORSEPOWER OR HORSE-SENSE

MANAGING AGRICULTURAL TECHNOLOGY FOR PROFIT

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MACHINERY COSTS - WHAT ARE THEY?

Throughout the 70's the rule most people followed was a substitution of "Capital" for "Labour". The problems of hired labour, as well as, the costs involved justified larger equipment which allowed the owner-operator to do most of his own work. Has this been true for the 80's, if it even was in the 70's?

The attached Cash Flow Worksheet illustrates a 1000 acre grain farm in the Red Deer area. You will have to adjust this to your location and your production using the space provided for "your estimates". This farm has good yields and are using January 1985 prices. Two different lines of equipment are shown. The high investment line has an average value of $400/acre while the low value is slightly over $200/acre.

How much machinery can you afford? If the land is entirely paid for then production will allow you to finance 83% of the average high value ($402,000) of your machinery and the entire low value of machinery. This means that you can have $333,000 of machinery financed if your land is paid for. If, however, you are financing both land and machinery then the high investment farmer requires about 60% equity and 40% debt to make it while the low investment farmer can handle 50% debt.

The important point to remember is that since no one here is identical to this worksheet everyone needs to know this for his own operation. How much debt can your farm carry?

We should now spend a few minutes to examine our capital for labour substitution assumption made previously. Figure 2 illustrates the substitution of a 125 HP tractor and a S.P. Combine of the same capacity. The extra amount of time was required only in the cultivation operations since harvesting capacity was the same. An extra 235 hours is required by the smaller line of equipment. In the spring this means 30-16 hour days rather then 30-10 hour days.

The extra costs amounted to $31,100 per year or $31/acre. If this $31,000 is paid for in labour rather than capital this amounts to approximately $132/hour for the extra 235 hours required. Can we find someone to drive our tractor the extra 6 hours/day for $132/hour? This is only a small part of the entire questions which can be asked about smaller or older equipment v.s. bigger, newer ones.

But we must be able to justify our equipment on a tax basis even if we have some problems with the Capital/Labour issue. Figure 3 examines a tractor purchase of $110,000 with a trade in of $60,000. The trade in was originally purchased for $50,000 and full depreciation was taken each year.

Examining this situation from a cash basis we see that if our farmer is in a 30% tax bracket (approximately $35,000 taxable income) then we would have a savings of $8,900 of tax. If he paid cash for the difference then the first year he had $55,000 cash out for a savings of $8,900 or a net cash loss of $46,100. If he financed the difference then it cost him $14,200 in cash to save $8,900 or a net cash loss of $5,300. In the second year the farmer who was able to pay cash, breaks even while the farmer who financed the purchase pays $14,200 to save $4,600 for a net cash loss of $9,600.

Now if the tractor is needed and this net cash loss can be offset by increased production or decreased operating costs then the purchase decision is a good one. If, however, it is based upon tax decisions only, you may want to look again.

If you are starting to wonder why you buy equipment at all, lets look at a lease decision. Figure 4(a) and 4(b) examines the lease of a $60,000 tractor (115 hp) v.s. its purchase.

The purchase 4(a) requires 30% down with the remainder financed over 5 years. The payment, interest and repairs are added together to show 'TOTAL' out flow. The tax benefits are then shown and totalled and this subtracted from the total above to result in an annual outflow. These figures have been calculated to a present value based upon 6% inflation and then added to a total of $55,271. Thus the purchase would cost a total of $55,271 of todays dollars.

The lease decision is based upon a John Deere, 5 year, 45% payment lease. Figure 4(b) shows once again that based upon todays dollars the cost would be $59,193 or about $4,000 greater. The basic advantage, however, is that the outflow is $4,148 less the first year and then approximately $1,300 per year less until the 5th year.

If you don't buy the leased tractor the cost is $39,016 over the 5 years. Likewise, if the purchased tractor is sold for 45% its cost is $37,682 but once again remember that the yearly cash outflow is somewhat less for the lease.

For many farms, a spare tractor is needed only in the fall and spring. If this is the case then possibly instead of buying or leasing you should consider renting. Figure 4(c) shows the cost of renting a $60,000 tractor for 400 hours (1 month in spring and 1 in fall). Over a 5 year period this would cost $31,500.

Since our lease was approximately $39,000 it can be shown that to break even this tractor could be rented for no more that 500 hours. Even at this, while the cost is the same the rental tractor would be available for a maximum of 4 months while the leased tractor is available for the entire year.

Machinery expenses are an important factor in farm production. All farmers should be in a position of both knowing how much their machinery is costing them, as well as, how much they can afford on their operation. These few calculations are the types of analysis that every farm operator should be doing or have done for him.

ASSUMPTIONS

- 1000 acre farm cropping 200 acres wheat
  500 acres Barley and 300 acres Canola
- Land valued at $900/acre

	WHEAT	BARLEY	CANOLA
Fertilizer			
N(24¢/lb)	70 lb.	70 lb.	90 lb.
11-51-0 (17.7¢/lb)	60 lb.	60 lb.	55 lb.
Herbicides			
Treflan			$11.00
Avadex	$10.00	$12.00	
Broadleaf	$ 6.00	$ 6.00	

Machinery and equipment financed at 14% for 5 years.

Land financed at 14% for 20 years.

Debt Servicing Capacity is the percentage of investment that could be carried as debt on an amortized basis.

EXAMPLE: DEBT SERVICING CAPACITY

Total Land Cost $900/acre x 1000 ac = 900,000

Amortization Factor (14% for 20 years) = .1510

Annual Payment 135,900

% of Income that can be carried as debt

$\frac{\text{Return } 98,200}{\text{Annaul Payment } 135,900} = 72.3\%$

CAPITAL INVESTMENT

High Investment

EQUIPMENT	COST	SALVAGE	LIFE	ANNUAL REPLACEMENT COST
250 HP Tractor	110,000	60,000	5	10,000
125 HP Tractor	52,000	20,000	10	3,200
30' Disc	27,000	7,000	10	2,000
35' HD Cult.	18,000	6,000	10	1,200
45' Field Cult.	18,000	5,000	10	1,300
60' Harrow Packer	20,000	5,000	15	1,000
28' Seed Drill	34,000	10,000	15	1,600
60' Sprayer	7,000	2,000	15	333
18' SP Swather	30,000	15,000	5	22,500
SP Combine	128,000	65,000	5	12,600
Trucks	36,000	12,000	8	3,000
Augers	7,000	1,000	15	400
Shop,Tools, Etc.	50,000	0	30	1,667
Buildings	60,000	0	30	2,000
TOTAL	597,000			43,300

Average Machinery Investment 402,000

Low Investment

EQUIPMENT	COST	SALVAGE	LIFE	ANNUAL REPLACEMENT COST
125 HP Tractor	52,000	20,000	5	6,400
80 HP Tractor	27,000	10,000	10	1,700
18' Disc	13,000	4,000	10	900
21 HD Cult.	11,000	4,000	10	700
24' Field Cult.	10,000	4,000	10	600
45' Harrow	6,000	1,000	15	333
14' Seed Drill	18,000	5,000	15	867
45' Sprayer	5,000	2,000	15	200
18' SP Swather	20,000	7,000	6	2,167
PT Combine	65,000	25,000	5	8,000
Trucks	35,000	12,000	8	2,875
Augers	3,000	0	15	200
Shop,Tools, Etc.	30,000	0	30	1,000
Buildings	40,000	0	30	1,333
TOTAL	335,000			27,275

Average Machinery Investment 215,000

DECEMBER 1984

CASH FLOW WORKSHEET

WHEAT BARLEY AND CANOLA PRODUCTION RED DEER AREA

Alberta
AGRICULTURE
Regional Economic & Business Services Branch

FIGURE 1

	PER ACRE				YOUR ESTIMATES
	WHEAT	BARLEY	CANOLA	TOTAL FARM	
Acres	200	500	300		
Yield	50	70	28		
Price	$ 4.50	$ 2.70	$ 8.00		
Income	$225.00	$189.00	$224.00	$206,700	
CASH COSTS					
- Seed & Treatment	$ 7.50	$ 6.75	$ 5.00		
- Fertilizer	27.50	27.50	31.25		
- Herbidices	16.00	18.00	11.00		
- Machinery Repairs	10.50	10.50	10.50		
- Machinery Operating	11.00	11.00	11.00		
- Taxes, Crop Ins., Utilities	10.00	10.00	12.50		
- Operating Interest	5.75	5.75	5.75		
TOTAL CASH COSTS	$ 88.25	$ 89.50	$ 87.00	88,500	
RETURN OVER CASH COSTS	$136.75	$ 99.50	$137.00		118,200
OPERATOR LIVING EXPENSES				15,000	
INCOME TAX				5,000	
RETURN OVER CASH COSTS & LIVING					98,200

	Low Investment 72.3%	High Investment 72.3%
DEBT SERVICING CAPACITY (LAND ONLY)		
DEBT SERVICING CAPACITY (MACHINERY ONLY)	100%[1]	83.8%
DEBT SERVICING CAPACITY (LAND & MACHINERY)	49.5%	38.8%

1. Funds remaining will cover full machinery debt and have $17,357 left over.

SUBSTITUTION OF CAPITAL FOR LABOUR?

Compare our high investment vs. low

250 HP + S.P. Combine

vs

125 HP + P.T. Combine

How much extra time?

- Combining -	Same
- Swathing -	Same
- Cultivating -	4 times
- Seeding -	1 time
- Harrow/Fertilizing -	1 time
	6 operations with 21' vs 35' equipment

21' @ 5 mph = 12.73 A/hr @ 80% eff. = 10.2 Acre/hr.

6000 acres requires 588 hours
5/6 in spring = 490 hrs - 30 days = 16 hrs.

35' @ 5 mph = 21.2 A/hr @ 80% eff = 17 Acre/hr.

6000 acres requires 353 hours
5/6 in spring = 294 hrs @ 10 hrs = 30 days

Therefore small equipment requires a total of 235 hours extra.

EXTRA COSTS:

	High Investment	Low Investment
Annual replacement	43,300	27,800
Interest on Investment @12% - 402,000 A12% - 215,000	48,300	25,700
Repair Costs 150% of high		5,000
Operating Costs 120% of High		2,000
	91,600	60,5000

= $31,100 difference or $31/Acre.

$31,100 savings - 235 hrs. = $132/hr.

'OR'

- Purchase a second used tractor of comparable hp and use second man on this for harrowing, seeding, etc.

FIGURE 2

TAX BUYING

Purchase a $110,000 tractor. Traded in a tractor which was originally purchased for $50,000 with an allowance of $60.000 on trade.

PURCHASED:	50,000
TRADE IN:	60,000 - 6 yrs old/full depreciation taken
NEW PURCHASE:	110,000
U.C.C.A.:	8,000 (in pool)

YEAR 1

TAX:

Capital Gains

60,000 - 50,000 = 10,000 - 2 = $-5,000

Capital Cost Allowance

8,000 - 50,000 + 102,300 = 60,300

@ 30% x ½ = 15% = $+9,000

$+4,000

@ 30% tax bracket .3

$ 1,200

Investment Tax Credit

110,000 x .07 = $ 7,700

$ 8,900

CASH FLOW

YEAR 1	CASH	FINANCE
Trade in difference	-50,000	
"or" payment @ 13%/5 yrs.		-14,200
Loss on Investment Income @ 10%	- 5,000	-
CASH OUT	$55,000	$14,200
NET CASH POSITION:	-46,100	- 5,300

YEAR 2

Capital Cost Allowance

(60,300 - 9,000) x 30% = $15,400

@ 30% tax bracket $ 4,600

CASH FLOW

YEAR 2	CASH	FINANCE
Payment @ 13%/5 years	-	-14,200
Loss on Investment income @10% (55,000 - 8,900)	4,600	-
CASH OUT	4,600	14,200
NET CASH POSITION	0	- 9,600

FIGURE 3

$60,000 tractor
- 30% down
- remainder over 5 years @13%
- 25% tax bracket
- 3% repairs increasing 6%/year

	0	1	2	3	4	5
PAYMENT	18,000	8,400	8,400	8,400	8,400	8,400
INTEREST		5,460	4,368	3,276	2,180	1,092
REPAIRS		1,800	1,854	1,909	1,966	2,026
TOTAL	18,000	15,660	14,622	13,585	12,546	11,518
TAX BENEFIT						
I.T.C.	4,200					
C.C.A.	2,092	3,557	2,490	1,743	1,220	854
INT & REP	-	1,815	1,556	1,296	1,037	780
TOTAL	6,292	5,372	4,046	3,039	2,257	1,634
ANNUAL OUTFLOW	11,708	10,288	10,576	10,546	10,289	9,884
PRESENT VALUE	11,708	9,706	9,412	8,854	8,151	7,386

TOTAL = $55,271

If tractor is sold for 45% of new = $27,000

= 55,217 - (27,000 x .7473) + (854 x .7473) + (10,731 x .25 x .7473)
55,217 - 20,177 + 638 + 2004

= $37,682

FIGURE 4(a)

Lease a $60,000 tractor - John Deere
6% inflation + 13% interest rate
24% tax bracket
45% payment at end of 5 years

	0	1	2	3	4	5
LEASE PAYMENT	10,080	10,080	10,080	10,080	10,080	
REPAIRS 3%		1,800	1,854	1,909	1,966	2,026
PURCHASE						27,000
TOTAL	10,080	11,880	11,934	11,989	12,046	29,026
TAX BENEFIT						
LEASE	2,520	2,970	2,984	2,997	3,012	507
C.C.A						1,013
TOTAL	2,520	2,970	2,984	2,997	3,012	1,520
ANNUAL OUTFLOW	7,560	8,910	8,950	8,992	9,034	27,506
PRESENT VALUE	7,560	8,406	7,966	7,550	7,156	20,555

TOTAL = 59,193

If tractor not bought

= 59,193 - (27,000 x .7473)
= 59,193 - 20,177
= $39,016

FIGURE 4(b)

Rental - Case 2094 - 115 hp - $60,000
- 18¢/hph - Minimum $2500/month
- ($21/hr) - 6% inflation

Rent a tractor for one month in spring and fall
200 hrs/month

		1	2	3	4	5
PAYMENT		8,400	8,904	9,438	10,005	10,605
TAX BENEFIT		2,100	2,226	2,360	2,501	2,651
ANNUAL OUTFLOW	6,300	6,678	7,078	7,504	7,954	
PRESENT VALUE	6,300	6,300	6,300	6,300	6,300	

= $31,500

To break even with leasing an extra tractor
39,000 - 5 = 7,800 - .75 = 10,400
@ 18¢/hph = $21/hr = 500 hrs.

FIGURE 4(c)